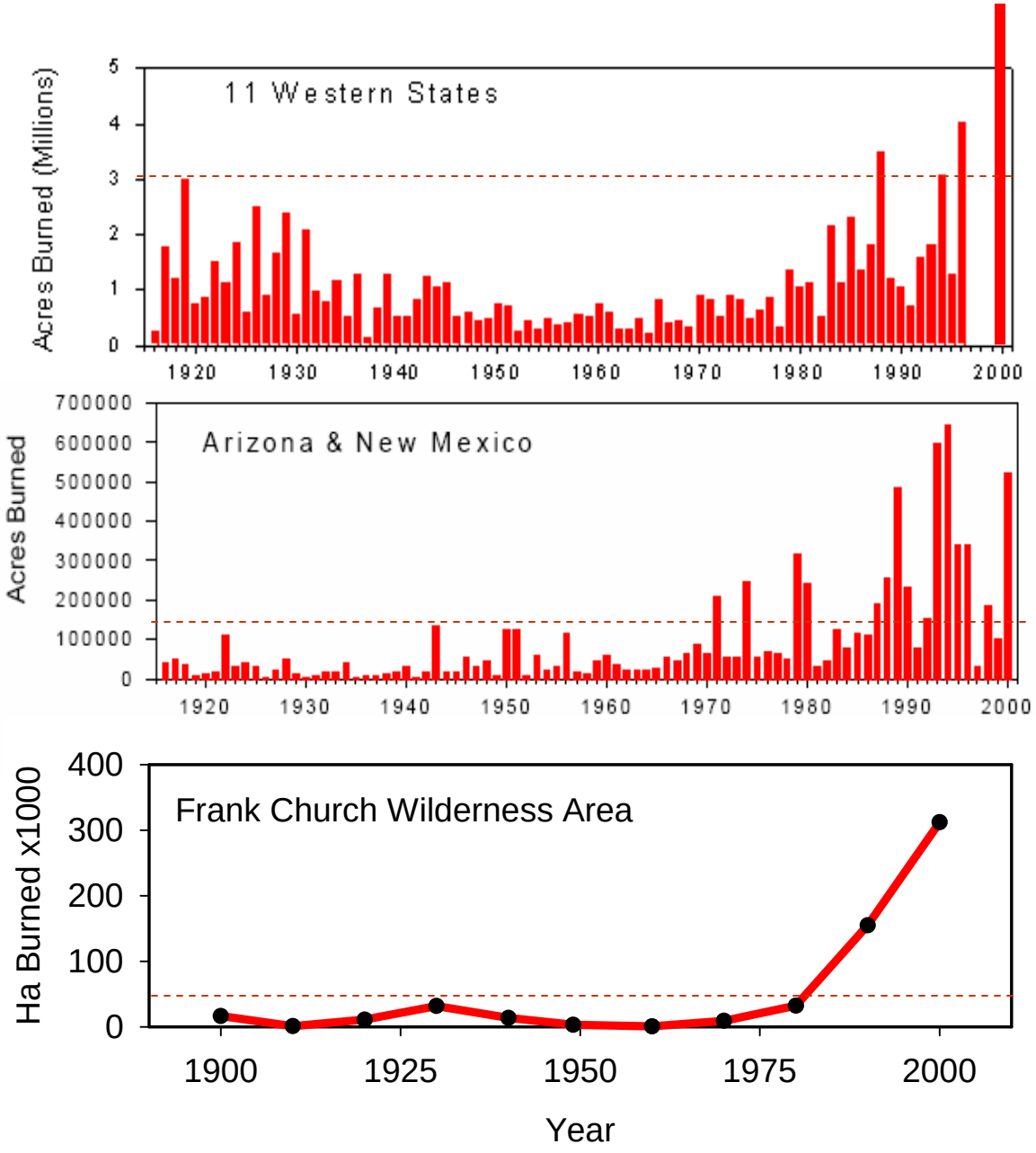


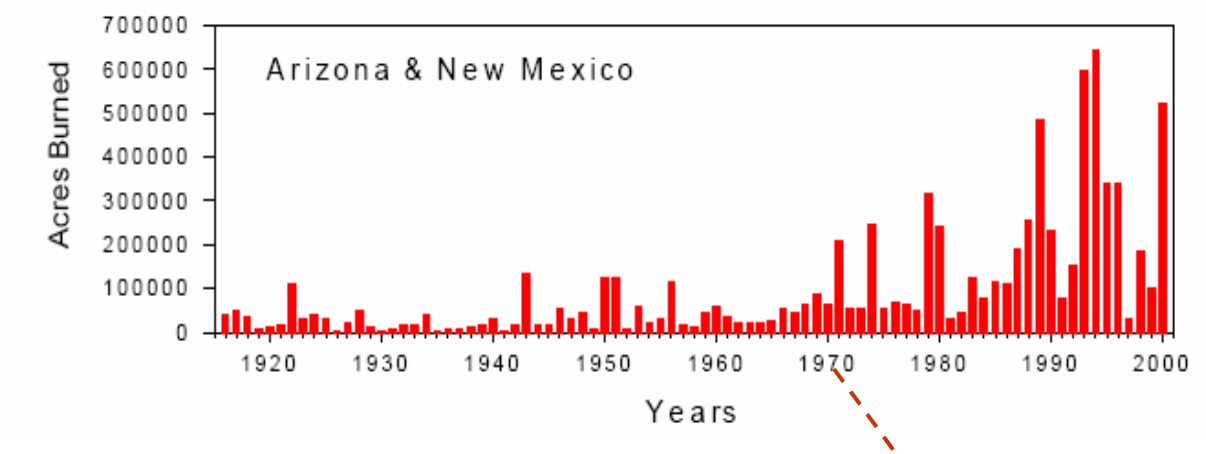
Large, crown fires in recent decades relative to late 1800's and early 1900's

Pattern more evident in dry areas

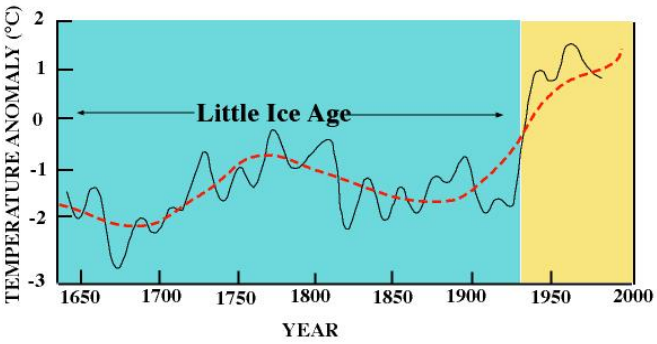
Sources: *Grissino-Mayer and Swetnam (2000)*; Aldo Leopold Wilderness Research Institute. Missoula, Montana.

WHY?

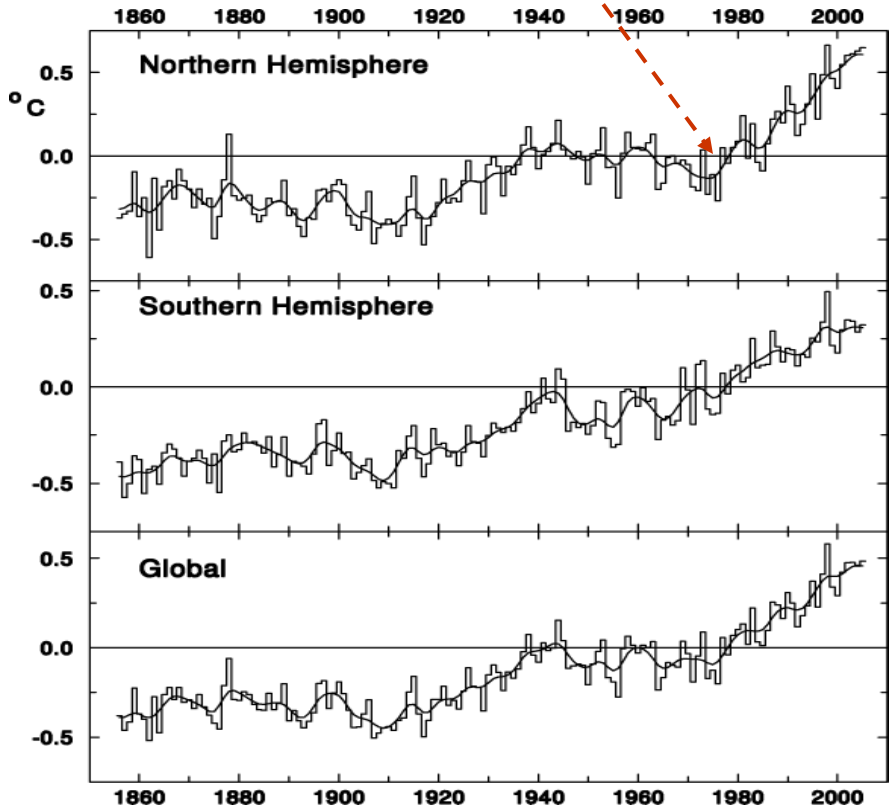
Drought



Pacific Northwest



Source: Stephen C. Porter Quaternary Research Center, University of Washington

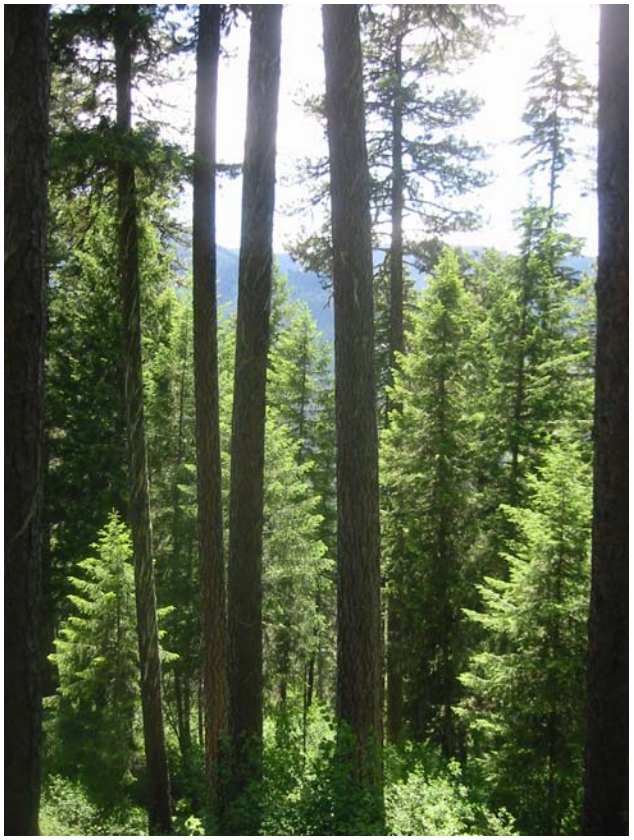


Source: Climatic Research Unit. University of east Anglia, UK.

WHY?

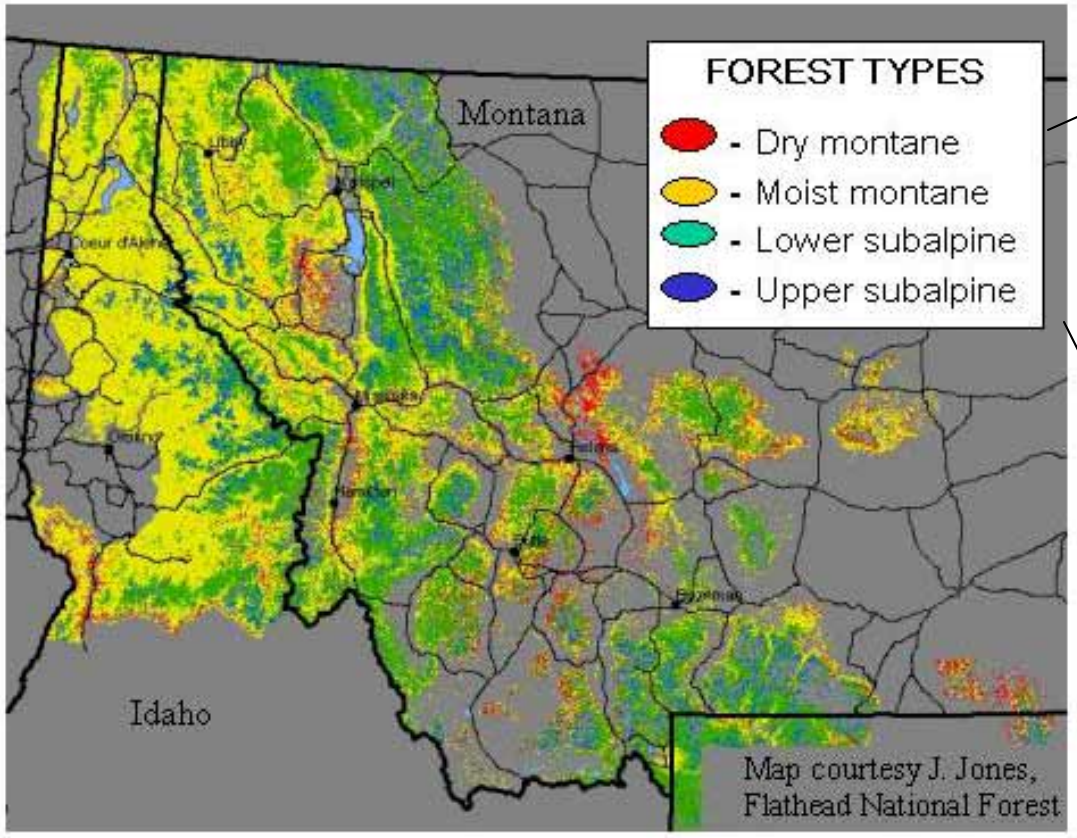
Fire exclusion → high forest density

Fire Exclusion →



HOWEVER ….

Not all forests in the west are dry or low elevation mixed ponderosa pine forests where frequent, low intensity fires were common



Low severity fire regime: frequent, low severity fires

Mixed fire regime: frequent low severity and infrequent crown fires alternate in space and time

High severity fire regime: infrequent crown fires

WHY?

1- Fire exclusion over the past century → high forest density

2- Drought

Only drought correlates with regional-level increases in catastrophic fires

Management is critically needed in the urban-wildland interface to protect communities

Much of the forests in the urban-wildland interface belong to the low severity fire regime

How can we reduce fire risk?

Restoration?

Restoration

Intervention to allow a system to return to its natural structure and function

Facilitate the transition to a known natural, past dynamic condition

What is the reference?

In dry and mixed, lower elevation ponderosa pine forests, fire exclusion during the past century has caused a shift in forest structure and function relative to pre-settlement conditions

Increase tree density
Increase shrubs

Lower water availability
Thicker forest floor
Lower N availability
Reduced tree growth

Increase epidemics
Increased fire hazard

For dry and mixed lower elevation ponderosa pine forests, pres-settlement structure and function is usually taken as the reference

Return to this reference would likely restore the historic fire regime

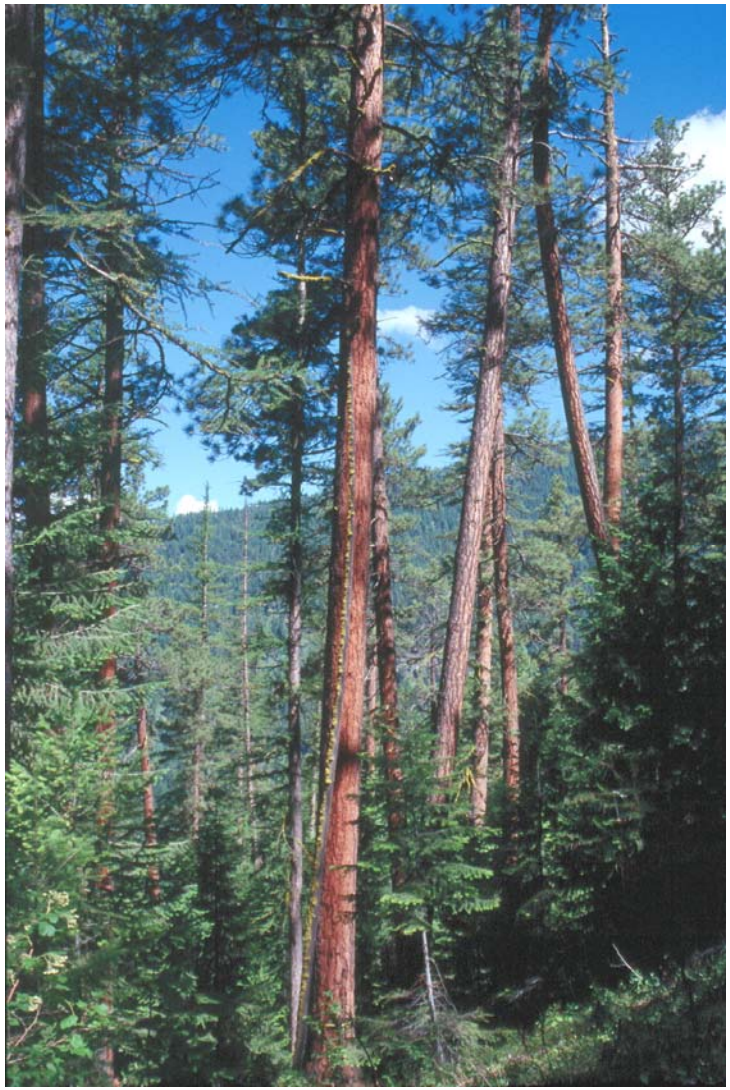
Do we want to have frequent fires in the urban wildland interface, even if fires are of low severity?

Or… is the goal to reduce fire risk in the urban wildland interface?

How?

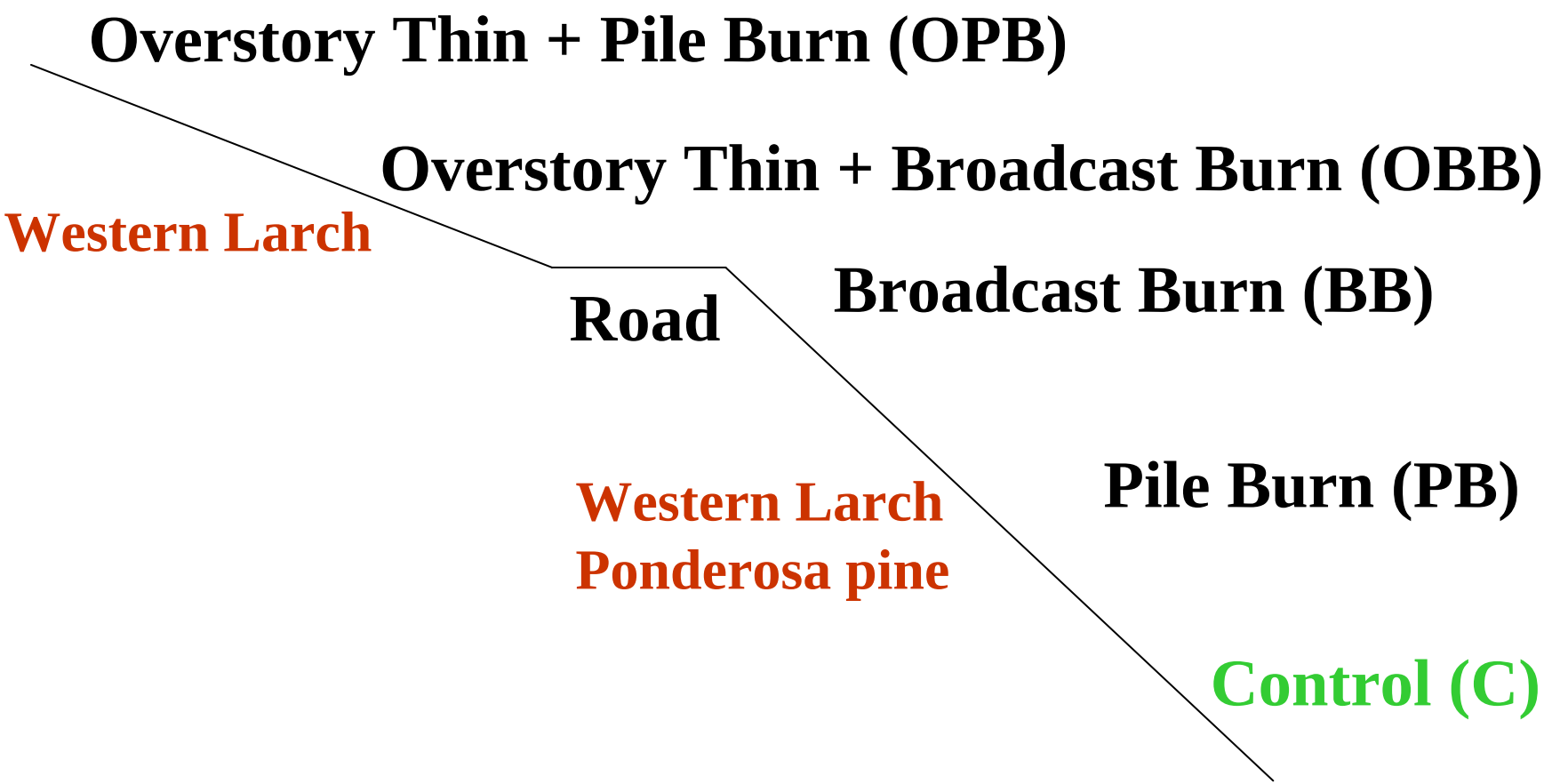
Thinning and prescribed burning

In addition to reducing fire risk, thinning and prescribed burning can have positive effects on tree function



Old Growth Restoration Project
Missoula, Montana

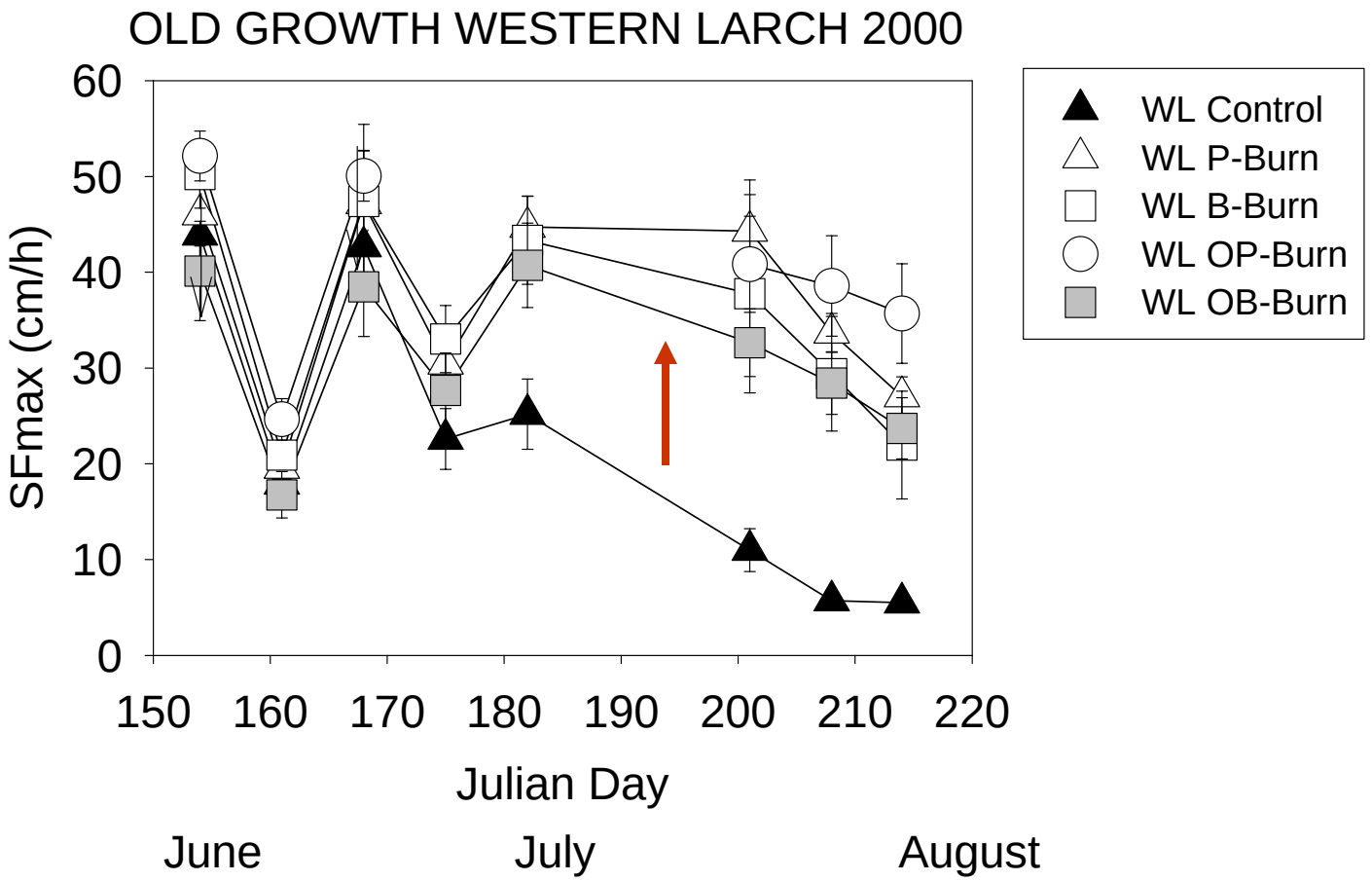
U.S. Forest Service
Rocky Mountain Research Station
Bitterroot Ecosystem Management Project



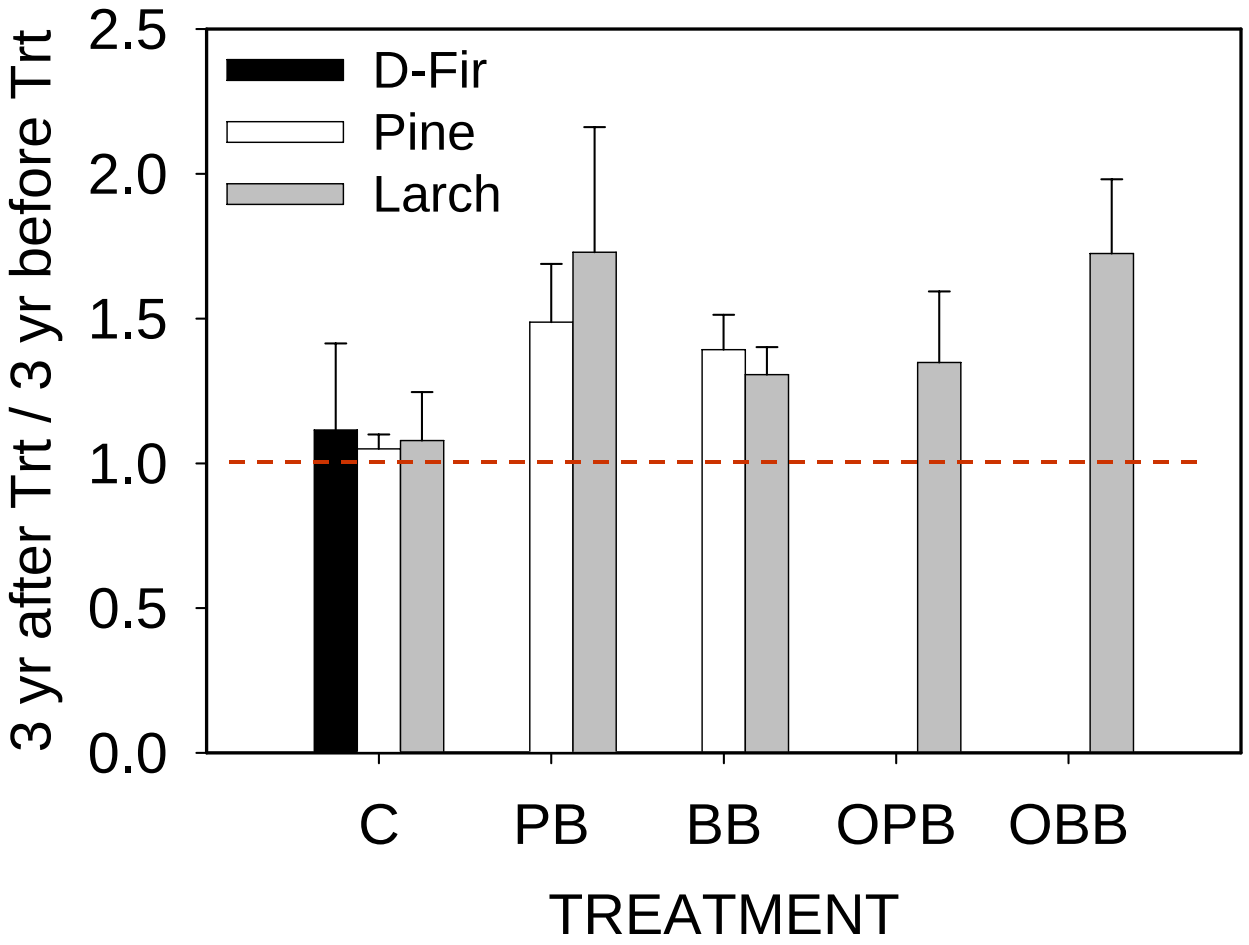
Five Treatments (fall 98-spring 99)

(initial thinning of the understory in all treatments, except Control)

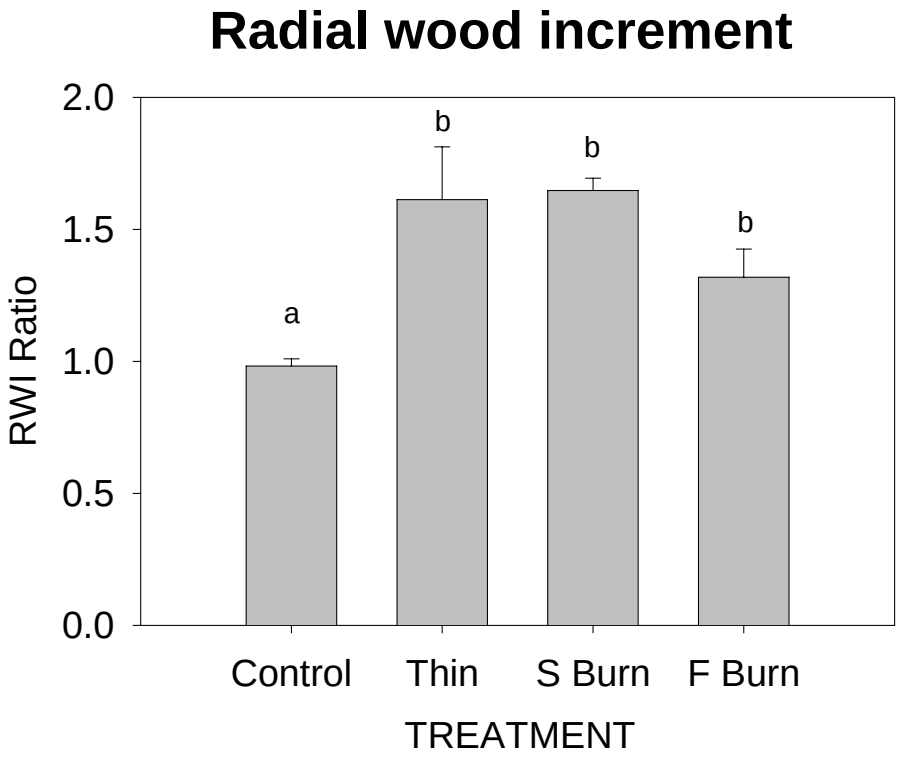
Treatment (Douglas-fir removed) increased water availability to remaining trees



Wood radial growth higher in treated plots



Second growth ponderosa pine forests: Lick Creek Demonstration Forest

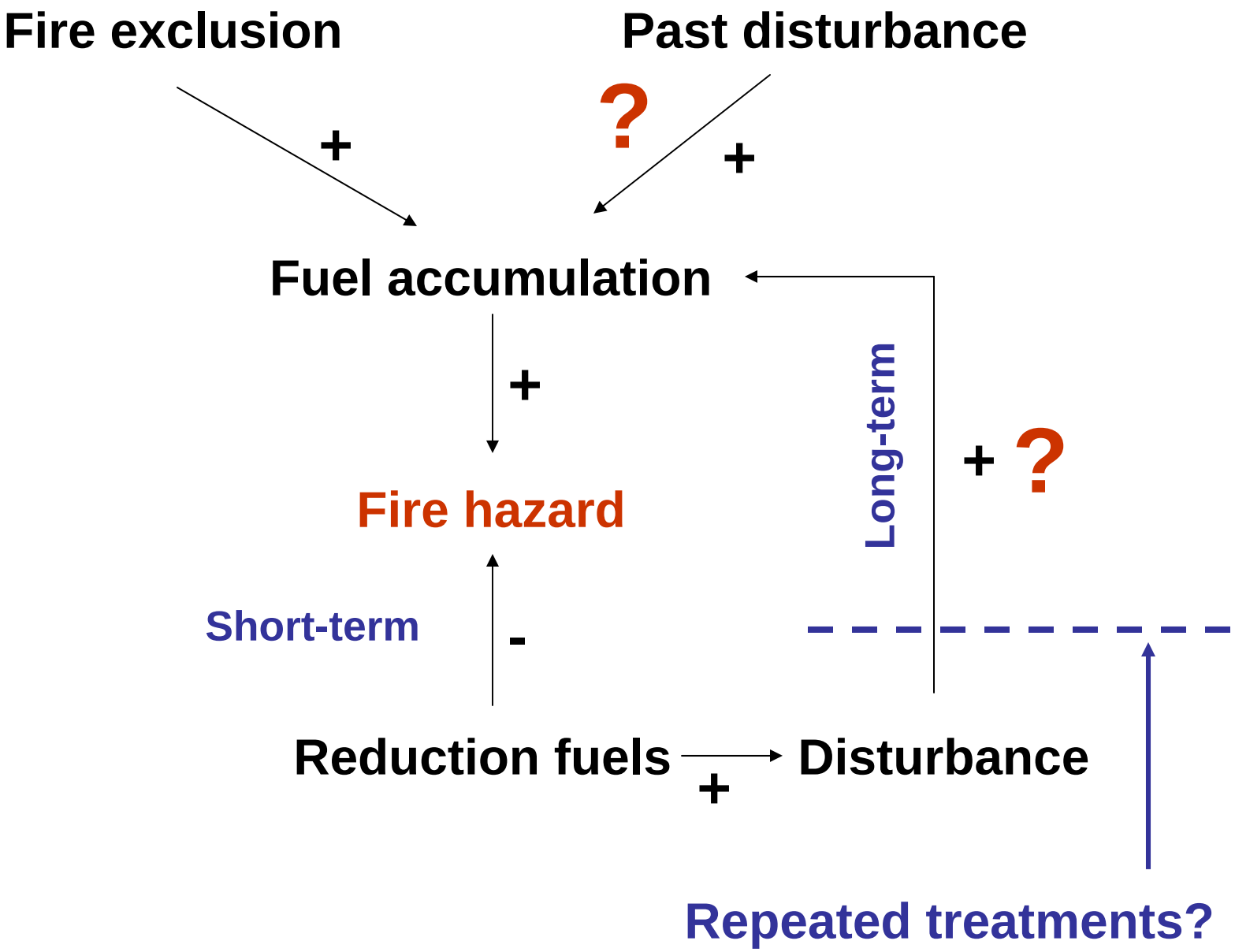


Sala et. al (2005)

Thinning and prescribed burning may effectively reduce fire risk and improve tree function

However, we need to think ahead …

Could thinning have counterproductive long-term effects?

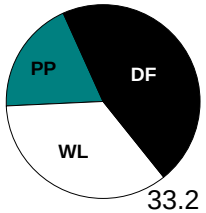

Fire exclusion
Past disturbance
?
+
+
Fuel accumulation
+
Long-term
+ ?
Fire hazard
Short-term
-
Reduction fuels
+
Disturbance
Repeated treatments?

Lightly logged in the past

1901

7.1 m^2/ha

1992 Fire excluded

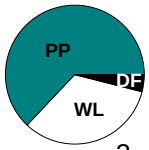


33.2 m^2/ha

Adapted from Habeck (1994)

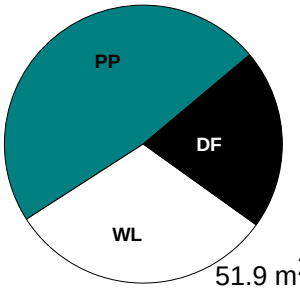
Logging in surrounding landscape

1900



19.4 m^2/ha

1994 Fire excluded

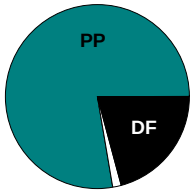


51.9 m^2/ha

Adapted from Arno et al. (1997)

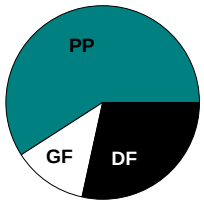
Not logged Remote areas

2003
Repeated fires



26.6 m^2/ha

2003
No fires



32.1 m^2/ha

Adapted from Keeling et al. (*in review*)

Prior disturbance may enhance recruitment and fuel accumulation in fire excluded stands

Concluding remarks

Fire exclusion during the 20th century has caused an increase in density in pure and mixed, low elevation ponderosa pine forests

These forests occupy a significant portion of the wildland-urban interface, where management is critically needed to reduce severe fire risk

Full restoration to pre-settlement conditions would return frequent, low severity fire in these areas

Careful thinning and prescribed burning treatments may effectively reduce fire risk and improve tree function

Thinning may have unknown counterproductive effects in the long term: close follow up and repeated treatments may be necessary

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Bitterroot Ecosystem Management Project

Aldo Leopold Wilderness Research Institute

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